

Calculating directly for Naples we find :—

	h. m. s.	Mean time at
Totality began October 12	at 2 18 18	{ Naples.
," ended	," 2 19 28	

The duration of the total eclipse was 1m. 10s., which is in satisfactory agreement with the words of Kepler. The sun was at an altitude of 31°.

THE BINARY STAR *a* CENTAURI.—As far as can be judged from a projection of the measures published to the present time, it appears probable that the nearest real approach of the components in this binary is already passed, but that they will continue to apparently close-in until the angle is somewhere about 110°, when their distance may have diminished to 1 $\frac{1}{4}$ ". We can only continue to urge upon southern observers the great importance of frequent measures of this object for some years to come, with all the precision that the case will admit of, that a problem of the highest interest in celestial mechanics may be fully investigated.

MIRA CETI.—This variable star is now close upon the epoch of minimum, as calculated from Argelander's formula of sines, and observations so far are much fewer in number near this part of the light-curve than about the maximum. The gradual ascent to the next maximum may be favourably watched in the present year; the date by the formula is November 10, 1877.

D'ARREST'S COMET.—By M. Coggia's observation at Marseilles on the morning of the 10th inst., it appears that M. Leveau's ephemeris gives the position of the comet within about 3'. Subjoined are the calculated places for Paris noon, during the next period of absence of moonlight :—

	Right Ascension.	North Polar Distance.	Distance from the Earth.
	h. m. s.		
August 8	... 3 57 35	... 83 45' 0	... 1' 559
," 10	... 4 1 12	... 83 53' 2	... 1' 555
," 12	... 4 4 43	... 84 2' 0	... 1' 551
," 14	... 4 8 7	... 84 11' 4	... 1' 547
," 16	... 4 11 24	... 84 21' 4	... 1' 543
," 18	... 4 14 35	... 84 32' 0	... 1' 538
," 20	... 4 17 38	... 84 43' 2	... 1' 533
," 22	... 4 20 34	... 84 54' 9	... 1' 529

This comet has not yet been observed under its most favourable situation with respect to the earth. When the perihelion passage occurs early in August, it may approach our globe within 0'3 of the earth's mean distance from the sun, but, so far, has not been seen within a distance of about 0'8. At the next return at the beginning of 1884, observations will probably be difficult, but in 1890, when the perihelion passage (as well as can be foreseen without the calculation of planetary perturbations) is likely to fall in the latter part of August or in September, the comet's track in the heavens will be a favourable one.

NOTES

THE annual meeting of the Institution of Mechanical Engineers opened on Tuesday at Bristol. Mr. T. Hawksley, C.E., in his opening address, said it was the duty of the government to adopt such timely measures as would secure to us the paths of the ocean for our food inwards and our manufactures outwards. He deprecated the building of enormous and unwieldy floating castles, and advocated the construction of a fleet of swift, light, well-engined ships, equally capable of sailing or steaming. He thought the extreme action of some of the working classes the cause of England's trades going abroad. There was a conversione in the evening.

A REMARKABLE case relating to manufacture and transport of explosives has just been the subject of an inquiry before the Wreck Commissioner. The facts are briefly these :—The pas-

senger sailing ship *Great Queensland* left London for Melbourne on the 5th of August last. After the 12th, when she was spoken at sea, she was never seen; but some wreckage from her was washed ashore the same month on the south coast of England. She had taken on board some thirty-four tons of gunpowder, including two tons of the "Patent Safety Blasting Powder" (a compound made in North Wales by treating wood pulp with acid, and stated to have five times the strength of ordinary gunpowder!). There was also a large quantity of detonators and percussion caps. The stowage seems not to have been up to the mark; still the Commissioner regards it as having been fairly safe, but for the danger of spontaneous ignition of the patent powder, to which the facts apparently point as the probable cause of the disaster. The evidence bearing on the manufacture of the compound is not a little surprising. In 1875, the manager in charge of the process was a Mr. Hunt, describing himself as "an engineer, but no chemist." The powder he turned out seems to have been dangerously impure, and some of it having come into the hands of a Government Inspector was found so bad that a regular visit was made to the Company's works. Eight samples were analysed and pronounced impure and dangerous. Mr. Hunt was displaced. His successor, a Mr. Thistleton, made an attempt, at the directors' request, to re-dip the powder left by Mr. Hunt; but the smoke became intolerable, and at 110 deg. the sides smouldered into fire and dirtied everything about, while the heat broke the windows and charred the woodwork. He accordingly suggested that the only way was to dip it in potash solution. The process of remaking was going on in the early months of last year, and it was a portion of this remade impure powder of Mr. Hunt which was shipped on the *Great Queensland*. A few days after she sailed news came of an explosion at the Patent Gunpowder Works, and Major Majendie, having examined a cartridge found on the works after this, wrote that "accident is hardly the term to apply" to what happened. The conclusion of the Wreck Commissioner, then, is that the same event happened at sea and caused the disappearance of the ship. The facts speak for themselves. The case is evidently one of gross mismanagement based on an ignorance which might be laughable, though not excusable, in people employed in mixing tea and coffee, but shameful in the direction of a company for making an explosive. Considering the scientific knowledge imperative in making and handling our modern explosives, the appointment of the one manager who was "no chemist," and of the other who was so good a chemist (from the Royal Polytechnic) as to proceed to *re-dip* Hunt's material *in order to make it stronger*, at the request of his directors, and was only warned off when this compound nearly blew him into the air, calls loudly for explanation. It is important that the whole responsibility involved in this disgraceful case be fully elucidated by further inquiry.

WE regret to announce the death of Prof. Adolph Erman, the well-known physicist, which occurred in Berlin, July 13th. He was born in Berlin, 1806, and after completing a broad range of scientific study, devoted himself to physics, following in the path of his father, who was then professor of that branch in the Berlin University. In 1828 he joined the Norwegian expedition sent out to Siberia to investigate the phenomena of terrestrial magnetism. His own researches were carried out far beyond the confined limits of the expedition, and after thoroughly examining the hitherto almost unknown volcanoes of Kamtschatka, he terminated his journey by completing the circuit of the world in a Russian frigate. The rich store of magnetic observations made during the entire tour were gathered together into a work of two volumes. In 1834 Erman was appointed Professor of Physics at Berlin, a post which he continued to occupy up to the time of his death. From 1841-1866, he edited the *Archiv für wissen-*

schaftliche Kunde von Russland, a periodical issued at the expense of the Russian Government and designed to keep the world at large informed of the progress of scientific research in Russia. His investigations, extending into nearly every branch of the natural sciences, appeared chiefly in *Poggendorff's Annalen* and the *Astronomische Nachrichten*. The most valuable are his researches on terrestrial magnetism. In connection with H. Petersen he calculated the constants for Gauss's theory of terrestrial magnetism, based on his own multitudinous observations. A most valuable contribution to Gauss's theory is also to be found in his work on the magnetic phenomena of the year 1829, which includes a complete study of secular changes based on all then made observations. An equally exhaustive work on the magnetic phenomena of 1860, was left uncompleted at his death. In 1874 Prof. Erman was elected a fellow of the Royal Society.

WITH the view of extending the rudimentary teaching of physiology and the laws of health in elementary schools, the National Health Society has placed at the disposal of the School Board for London, in addition to a sum of 100*l.* offered previously, a further amount of 25*l.* annually for four years, to be given in premiums to those teachers and children who pass the best examinations in these subjects.

SINCE the institution of the Morgue in Paris, unidentified bodies have, it is known, been exposed, unclad, on stone slabs. It has now been decided (we learn from the *Revue Scientifique*) that the dead shall be placed before the eyes of the public just as they have been found, with the proper exception of those who bear on any part of their body a mark which may facilitate recognition. It is anticipated that this measure will increase by a third the number of identifications at the Morgue.—A course of lectures on legal medicine at the Morgue will be commenced in November. This practice has been discontinued for the last fifteen years.

THE Helvetic Society of Natural Sciences is to hold its annual congress at Bex, canton de Vaud, on August 20, 21, and 22.

THE intention is known to have been long cherished to erect a monument in Stockholm to Linnaeus, and a sum of 45,000 crowns has been collected for the purpose. There have been two proposals, and to carry out the smaller of these the sum just named would be sufficient. But since the conviction has of late gradually gained strength that the statue should be raised on the so-called "Flora's Bakke" (Flora's Hill), in the Hop Garden, a desire has also grown to realise the larger proposal, according to which Linneus would appear surrounded by four allegorical figures representing the four sciences to which he devoted himself, viz., Botany, Zoology, Mineralogy, and Medicine. On the understanding that the commune will supply the necessary means for the pedestal and for erection of the monument, a sum of 30,000 crowns was still required to give effect to the larger scheme, and a subscription list has lately been started by thirty influential citizens of the Swedish capital with this object. These thirty have together subscribed 15,000 crowns, and it may be anticipated that the remaining 15,000 will ere long be forthcoming.

WE have recently received a large number of reports of local societies, several of them containing papers of more than local interest, but to which we can refer only in the briefest possible way. The Norfolk and Norwich Naturalists' Society is numerically and financially stronger than at any previous period. Among the twelve papers published in its *Transactions* is one by Prof. Newton, giving an interesting account of the naturalisation of the Edible Frog (*Rana esculenta*) in Norfolk. Mr. Randall Johnson contributes an approximate list of the extinct mammalia of Norfolk.—The *Annual Report* of the Manchester Scientific

Students' Association speaks favourably of its position and prospects, as does also the *Report and Proceedings* of the Manchester Field Naturalists and Archaeologists' Society in the case of that Society.—The Cardiff Naturalists' Society is a large one and its thick *Report and Transactions* for 1876 contains several good papers.—Other Reports or Proceedings received are from the Bath Natural History Society, the Miners' Association of Cornwall and Devon, the South London Microscopical and Natural History Club, the Croydon Microscopical Club, the East Kent Natural History Society, the Geological and Polytechnic Society of the West Riding of Yorkshire, the Torquay Natural History Society, the Brighton and Sussex Natural History Society, Quekett Microscopical Club, and the York School Natural History, Literary, and Polytechnic Society. Of one or two of the papers in the *Natural History Transactions* of Northumberland and Durham we hope soon to give a detailed notice.

THE heat conductivity of hardened caoutchouc has been recently determined by Prof. Stefan, of Vienna. With six plates of equal thickness a parallelepipedal vessel was formed, and arranged as an air thermometer. The apparatus having acquired the temperature of a regularly-tempered room, it was inserted quickly in a vessel of broken ice; the time of insertion, and the position of the mercury in the manometer immediately observed, and then the times noted at which the mercury reached particular heights. The thermometric conductivity was found about $0.000928 \frac{\text{cm}^2}{\text{sec.}}$. Taking the specific heat of unit mass of vulcanised caoutchouc = 0.23, and the specific gravity = 1.22, it follows that the thermal conductivity = 0.00026.

THE American expedition round the world, recently organised by Mr. Woodruff, of Indianapolis, is to start in October, and continue two years. Among the naturalists that have been engaged are Prof. Burt G. Wilder, of Cornell University, Dr. W. G. Farlow, Prof. Jenney, of Michigan University, Prof. Sidney J. Smith, of Yale College, Prof. S. C. Russell, of the School of Mines, Columbia College, C. Hart Merriam, and Dr. J. H. Kidder, U.S.N. The number of students is limited to eighty. The whole expense to each student is \$5,000.

AT the last session of the Berlin Photographic Society a report was presented on the extent of photography in Germany from which we glean some interesting statistics. In the German Empire there are 3,000 photographers, who require each on an average 3 lbs. of nitrate of silver annually. Austria possesses the same number of photographers, but the average annual consumption of nitrate of silver is but 1 lb. Germany manufactures 20,000 reams of albuminised paper annually, of which but 1,000 are for home use. 40,000,000 cartes-de-visite were prepared in Germany during 1876.

THE Italian Committee for the exploration of Africa held its first session in June at Turin, under the presidency of the Crown Prince. It was decided to co-operate vigorously with the International Committee. The Italian Committee will devote its energies at first to the establishment and maintenance of a station at Shoa, where the Marchese Antinori is at present, regarding this as one of the most desirable positions from which to send out expeditions into the interior of Africa.

THE Scottish Meteorological Society holds its half-yearly general meeting in Edinburgh to-day. The business includes reports by Mr. Buchan on the temperature of the sea at Peterhead, and on the relations of the herring fishery to meteorology, for the four years 1873-76.

THE first number of Prof. Hoppe-Seyler's new quarterly journal, the *Zeitschrift für physiologische Chemie* has appeared. It contains valuable papers on the process of urea-formation in animal bodies, and the influence of ammonia salts on this

(Salkowski).—On aromatic substances in the animal body, and determination of sulphuric acid in urine (Baumann).—On animal and plant albuminous bodies (Weyl).—On lactosuria (Hofmeister); and on the physiology of lactic acid (Spiro). The journal is a decided acquisition to scientific literature.

WE have received the programme of excursions of the Manchester Field Naturalists' and Archaeologists' Society for July to October. The seven excursions arranged (for Saturdays) appear to be of a varied and interesting character.

THE additions to the Zoological Society's Gardens during the past week include an Egyptian Gazelle (*Gazella dorcas*) from North Africa, presented by Mr. H. B. Benson; a Malbrouck Monkey (*Cercopithecus cynosurus*) from West Africa, presented by Mrs. Escott; a Burmeister's Cariama (*Chunga burmeisteri*), a Brazilian Stilt Plover (*Himantopus brasiliensis*) from Buenos Ayres, two Black Swans (*Cygnus atratus*) from Australia, two Piping Guans (*Pipile cumanensis*) from Bahia, an Urumutum Curassow (*Nothocraz urumutum*) from Brazil, deposited; a Wapiti Deer (*Cervus canadensis*), an Indian Muntjac (*Cervulus muntjac*) born in the Gardens.

ASTRONOMICAL SYMBOLISM OF THE EAST¹

THE two stars which in the book of Job are connected with Orion, and to which the Indian Orion-legend referred, are connected with the two red stars or Rohini of Indian traditions. It is shown that these two fixed stars, observed as contemporaneously rising and setting on the horizon, formed the unchangeable starting points for regulating the lunations, and that they thus brought about in course of time an absolute correct chronology. The early discovery of equinoctial precession led to the substitution of these fixed stars by the changeable equinoctial points, till Copernicus, by separating the latter from the solar path, re-established the correct measurement of time by referring the solar motion to fixed stars. The determining single stars, later, constellations nearest to the equinoctial points, to which former, both Chinese and Persian, traditions refer, became the symbol of the order manifested by the heavenly bodies, which cosmical order was attributed to the Deity. The symbol of the two cherubs or kirubs, that is "bulls," in the language of cuneiform inscriptions, are shown to have referred to the rising and setting of the constellation of Taurus, which being called Kirab at its rising, was called Seraph, or Ser-Apis, literally, "the grave of the bull," at its setting. The Pleiades in the neck of Taurus stand in the same relation to this constellation as the god Sebaot, the god of the Sheba-ut, or seven stars, the Sibat of the Babylonians, to the Cherub. The symbol of the chariot of the Cherubim, and of Jehovah riding on the Cherub, as the Pleiades may be said to be riding on Taurus, are thus astronomically explained, and connected with the representations of Oranuzi riding on the winged bull, as also with similar Mithraic representations. The fortnightly period of the Hebrews, from the new moon to the full moon, in connection with the precessional cycle of seventy-two years, probably known to the Hebrews, is shown to have formed the basis of the Osiris-Typhon legend, which was fully developed before the commencement of Egyptian history. The fourteen divisions of the litanies of Thot, the god riding on the moon, and whose secret number was seventy-two, are explained by reference to fourteen moon-stations of the lunar zodiac, the hidden Mazzaroth or mansions of the moon in the book of Job, and to the precessional cycle of seventy-two years, with which can be connected the solar year and the Phoenix period of the Egyptians, the Saros of the Babylonians, and the Mosaic period of one day like a thousand years, as well as several other Babylonian periods; also the number of the sons of Japhet, and the genealogies in Luke from Seth to Joseph, the husband of Mary. When the solar zodiac had taken the place of the lunar zodiac, when the two determining fixed stars had been replaced by the changeable equinoctial points, and the commencement of spring and of autumn became the fundamental symbol of all religions, the ideal heroes of light [were connected with the spring-equinox, at first in Taurus, and the ideal heroes of

¹ Abstract of paper read at the Society of Biblical Archaeology, "On Astronomical Symbolism of the East, as transmitted by Hebrews and Christians," by M. Ernest de Bunsen.

darkness with the autumn-equinox, at first in Scorpio, close to which is the constellation of the Serpent. Thus to Ormuzd, Indra, Osiris, Dionysos and Apollos, were respectively opposed the serpent deities Ahriman, Ahi, Typhon, the Titans and Python. So also the Messiah, "The Sun of Righteousness," and "the day-spring from on high," was opposed by Satan, literally the antagonist, "the old serpent" the devil. The transition from the sacrifice of bulls to the sacrifice of lambs, and the vicarious and sin-removing character of these sacrifices in pre-Abrahamic times, is shown to have been connected with, and probably to have been caused by equinoctial precession, by Aries having taken the place of Taurus. Some of the mysteries of the Great Pyramid are explained by Eastern astronomical symbolism and the two passages pointing north and south are shown probably to have referred to the approximatively contemporaneous midnight culminations of Aldebaran and Antares at the autumn equinox, as observable at places in the latitude of the Great Pyramid, and likewise in the latitudes of Bactria and Northern India, during a period of about 150 years, within which the year 3300 B.C. falls. The fact that Chinese, Indians, and Arabians, at a remote period, counted twenty-eight moon stations, but that there is nowhere a trace of twenty-nine mansions of the moon, is submitted as possibly implying a date for the earliest astronomical observations of the East transmitted to us, at a time when the lunar month, now having a duration of about twenty-nine and a half days have only twenty-eight days, or rather, not yet twenty-nine. As the mean motion of the moon is the same in long periods, this period of twenty-nine days would have probably commenced about 600,000 years ago, if the retardation of the earth's rotatory motion, by which alone the prolongation of the lunar month seems to be explainable, really does amount to twenty-two seconds in a century, as now asserted by high authorities.

THE NORWEGIAN EXPEDITION TO THE NORTH SEA

FROM a letter by Prof. G. O. Sars, in the *Christiania Dagbladet*, dated Bodø, June 24, we make the following quotations with reference to the progress of the Norwegian expedition which left Bergen on June 11:—

"On the 16th of June we had arrived sufficiently far northward to commence our labours, and sounding-lines, thermometers, dredges, and trawling-nets were at once called into use. Since then the work has been pursued unremittingly, despite stormy weather, and we have every reason to be satisfied with the results so far. The hitherto-unknown contour of the sea's bottom between Foiden fiord and the Lofoten Islands is now so clearly ascertained by means of our transverse section, that we can map out to the north with a certain degree of precision the curve of the extended barrier, which keeps back the cold water coming from the depths of the Polar Sea. We have found the curve somewhat different from our expectations, especially in the neighbourhood of the Lofoten. The soundings appear to indicate the presence of a remarkable indentation, similar to the one on the southern part of the coast, and we have found a precipitous slope of the sandbank resembling that of the well-known "Storeg" near Aalesund. It is evident that we have encountered here a most important submarine conformation. The consideration of its effect on our sea-fisheries will be delayed until more detailed surveys have been carried out. In the course of our soundings on the way to Bodø, we were able by means of the improved Negretti-Zambra thermometer to establish beyond the range of doubt the presence of a layer of warm water below a layer of cold water of considerable depth.

"Our zoological acquisitions have been highly satisfactory, especially those in the cold zone. We have added several species to the list of the previous expedition; amongst them some hitherto detected in the Polar Sea only and others entirely new.

"The voyage will be pursued to Røst, where several days will be spent in magnetic observations, and in gathering zoological specimens. The latter promise to be of value on account of the zoographical interest of the locality, which has as yet been left unvisited. The section from Røst will be followed carefully in order to determine with certainty the expected bend in the sandbank. The progress of our expedition shows us more and more the fundamental importance of an accurate knowledge of the physical nature of the North Sea, not only for Norway, but also for the solution of the general questions with regard to the physical and biological conditions of the ocean in general."